CONCERNING THE NAMES *SCAGELIA CORALLINA* AND *HETEROSIPHONIA WURDEMANNII* (CERAMIALES, RHODOPHYTA)

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SUMMARY. — The names of two species of marine red algae of the order Ceramiales are treated. *Scagelia pylaisaei* (Montagne) comb. nov. is proposed as the taxonomically and nomenclaturally correct name for the species that has recently been called *Scagelia corallina*.

Callithamnion crispellum C. Agardh is shown to be an older name available for *Heterosiphonia wurdemannii* (Bail. ex Harv.) Falkenb., and *H. crispella* (C. Ag.) comb. nov. is proposed. *Heterosiphonia crispella* var. *laxa* (Børges.) comb. nov. is also recognized.

RÉSUMÉ. — Les noms de deux espèces de Céramiales marines font l'objet d'une étude critique. Le nom de *Scagelia pylaisaei* (Montagne) comb. nov. est proposé comme seul correct au point de vue taxonomique et nomenclatural pour l'espèce récemment dénommée *Scagelia corallina*. *Callithamnion crispellum* C. Agardh, ayant priorité sur *Heterosiphonia wurdemannii* (Bail. ex Harv.) Falkenb., *H. crispella* (C. Ag.) comb. nov. est proposé. *Heterosiphonia crispella* var. *laxa* (Børges.) comb. nov. est aussi reconnu.

KEY WORDS : Rhodophyta; Ceramiales; *Heterosiphonia crispella* comb. nov.; *Heterosiphonia wurdemannii*; *Scagelia corallina*; *Scagelia pylaisaei* comb. nov.

Scagelia corallina

Problems presently exist in regard to the name of the ceramiacean alga *Scagelia corallina*, which is thought to have a circumboreal distribution (KJELLMAN, 1883, 1890; ZINOVA, 1955; TAYLOR, 1962). Two papers, both published in 1981, were in agreement on the taxonomic opinion that *Antithamnion corallina* should be transferred to *Scagelia* of WOLLASTON (1971). The first of these papers (HANSEN and SCAGEL, 1981, «June 29») made the new combination *Scagelia corallina* but based this transfer on the illegitimate name *Callithamnion corallina* Ruprecht (1851), a later homonym of *Callithamnion corallinum* Lyngbye (1819). According to Article 72, Note 1, of the Interna-

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tional Code of Botanical Nomenclature (VOSS et al., 1983), *Scagelia corallina* Hansen & Scagel can be treated as a new name as of the date of their publication, i. e. June 29, 1981. YOSHIDA (1981, «July») recognized that *Callithamnion corallina* of RUPRECHT was an illegitimate name and thus based his combination of *Scagelia corallina* on *Antithamnion corallina* Kjellman (1877), which, again according to Article 72, Note 1, of the Code, can be treated as a new name of KJELLMAN. However, Yoshida's combination has been preempted by the earlier appearance of the usage by HANSEN and SCAGEL. So this name *S. corallina* (Kjellman) Yoshida is a later homonym of *S. corallina* Hansen & Scagel. This note attempts to resolve this problem.

HANSEN and SCAGEL (1981) included a list of taxonomic synonyms of their *Scagelia corallina*, one of these being *Callithamnion lapponicum* Ruprecht (1851). This would appear to be the oldest available name for this taxon. But in their discussion HANSEN and SCAGEL called attention to another possible synonym, namely, *Callithamnion pylaisaei* Montagne (1837), which was described from Newfoundland. In fact, SOUTH (1984) has recently treated *Antithamnion pylaisaei* (Mont.) Kjellm. as a taxonomic synonym of *Scagelia corallina*. An important point is that Montagne's name *Callithamnion pylaisaei* predates all these other names. So it was decided to investigate *Callithamnion pylaisaei* to determine whether it is a taxonomic synonym of *Scagelia corallina*. If it were not a taxonomic synonym, then *Callithamnion lapponicum* Ruprecht would become available.

In the original description of *Callithamnion pylaisaei* Montagne (1837) referred to the branches as being unequal and to the decussate or tetrastichous arrangement of the branches. Although MONTAGNE did not illustrate his alga, KÜTZING (1861) did depict this species and indicated that his figures were based on material sent to him by Montagne. KÜTZING's plate 90, fig. g, is informative in that it shows that there are at least three whorl-branches arising from a segment. The figure of the habit also gives the strong impression of an axis in which whorl-branches are arranged as in *Scagelia* rather than the opposite arrangement typical of *Antithamnion sensu stricto* of WOLLASTON (1971). This would also explain MONTAGNE's reference to their decussate and tetrastichous pattern. Furthermore, the unequal size of their whorl-branches conforms to this trait in *Scagelia*. Both HARVEY (1853) and TAYLOR (1962) stated that the pinnules in *Antithamnion pylaisaei* taper to an acute point and that these pinnules are compoundly branched, as figured by HARVEY (1853, pl. 36B).

Material that has been identified as *Antithamnion (Callithamnion) pylaisaei* has been distributed as No. 155 in Algae Exsicc. Am. Bot., as No. 97 in Phyc. Bor.-Am., and as No. 199 and No. 200 in Algae Terrae Novae. No. 200 is labeled as having the winter morphology and has the short, subulate, whorl-branches typical of *A. pylaisaei*. No. 199, on the other hand, is labeled as having the summer «*A. boreale*» morphology and has the long, flexuous whorl-branches also present in *A. americanum*. Specimens of these exsiccatae present in MICH have been examined as well as additional collections* made in Newfoundland

and identifiable as *Antithamnion pylaisaei*. The morphological characteristics expressed in these collections identified as *Antithamnion pylaisaei* (Fig. 1) are generally in agreement with those of *Scagelia corallina* as depicted by KJELLMAN (1883), HANSEN and SCAGEL (1981), and YOSHIDA (1981).

RUPRECHT (1851), in describing his *Callithamnion corallina* from Dshukdshandra, Okhotsk Sea, referred to the whorl-branches as being arranged both in an opposite and verticillate arrangement on the main axes. These branches were described as awl-shaped and as presenting a thick and bushy appearance in the upper parts of the plants, although the plants were not stiff. KJELLMAN (1883) also depicted *f. corallina* (of *Antithamnion boreale*) as having the whorl-branches in fours from the segments of the main axes, and he reported that this form has its branch systems crowded into dense fascicles in the upper parts of the plant. Gland cells were not mentioned, but a «strong tendency» of *A. boreale* toward *A. pylaisaei* was pointed out.

LUND (1959) recognized *Antithamnion boreale*, which he said was connected by intermediate stages to f. *corallina*. The whorl-branches in *A. boreale* were in opposite pairs but «not infrequently» in whorls of three, whereas the axes of *f. corallina* had a partly verticillate arrangement of whorl-branches in threes and with dense fascicles at the tips of the main axes.

SOUTH (1984), referring to unpublished observations of Whittick, stated that complete morphological intergradations exist between *A. corallina*, *A. americanum* and *A. pylaisaei sensu* Taylor (1962), causing him to treat these several species as within the concept of *Scagelia corallina*. Earlier workers have long pointed out problems in separating these species. FARLOW (1881) reported that transitional forms exist between typical *A. pylaisaei* and typical *A. americanum*. Usually the whorl-branches of *A. pylaisaei* are short and thick, with the final divisions broadly subulate, whereas the whorl-branches of *A. americanum* are long, slender, and flexuous, as figured by HARVEY (1853). FOSLIE (1890) stated that he found it very difficult to distinguish *A. boreale* and *A. pylaisaei*. By culturing experiments SUNDENE (1962) demonstrated the polymorphic nature of *A. boreale*; he concluded by recognizing *corallina* as a variety of *A. boreale*. LUND (1959) had earlier admitted that «intermediate stages» connect these two forms.

Next, there is the need to discuss the relationship of *Antithamnion occidentalis*, described by KYLIN (1925) from Friday Harbor, Washington, to the «*Scagelia corallina*» complex. To supplement the observations of other authors, I have examined collections** in MICH coming from the vicinity of Friday Harbor (Fig. 2).

* Wynne 6335, legit J. Kain, 15.viii.1982, east side of Swale Island, Newman Sound, Terra Nova National Park, Newfoundland, Canada; male. Wynne 6357, legit J. Kain & D. Keats, 14.viii.1982, Seal Island, near Swale Island, Newman Sound, Terra Nova National Park, Newfoundland, Canada.

** Wynne 2801, legit P. Lebednik & T. Mumford, 26.vi.1970, Minnesota Reef, San Juan Island, Washington, U.S.A.; male, female, tetrasporic. Wynne 4782, legit M. Wynne, 25.vi.1978, Eagle Cove, San Juan Island, Washington, U.S.A.; male, female. Wynne 4938, legit M. Wynne, 19.vii.1978, Smith Island, south of San Juan Island, Washington, U.S.A.; male, female.

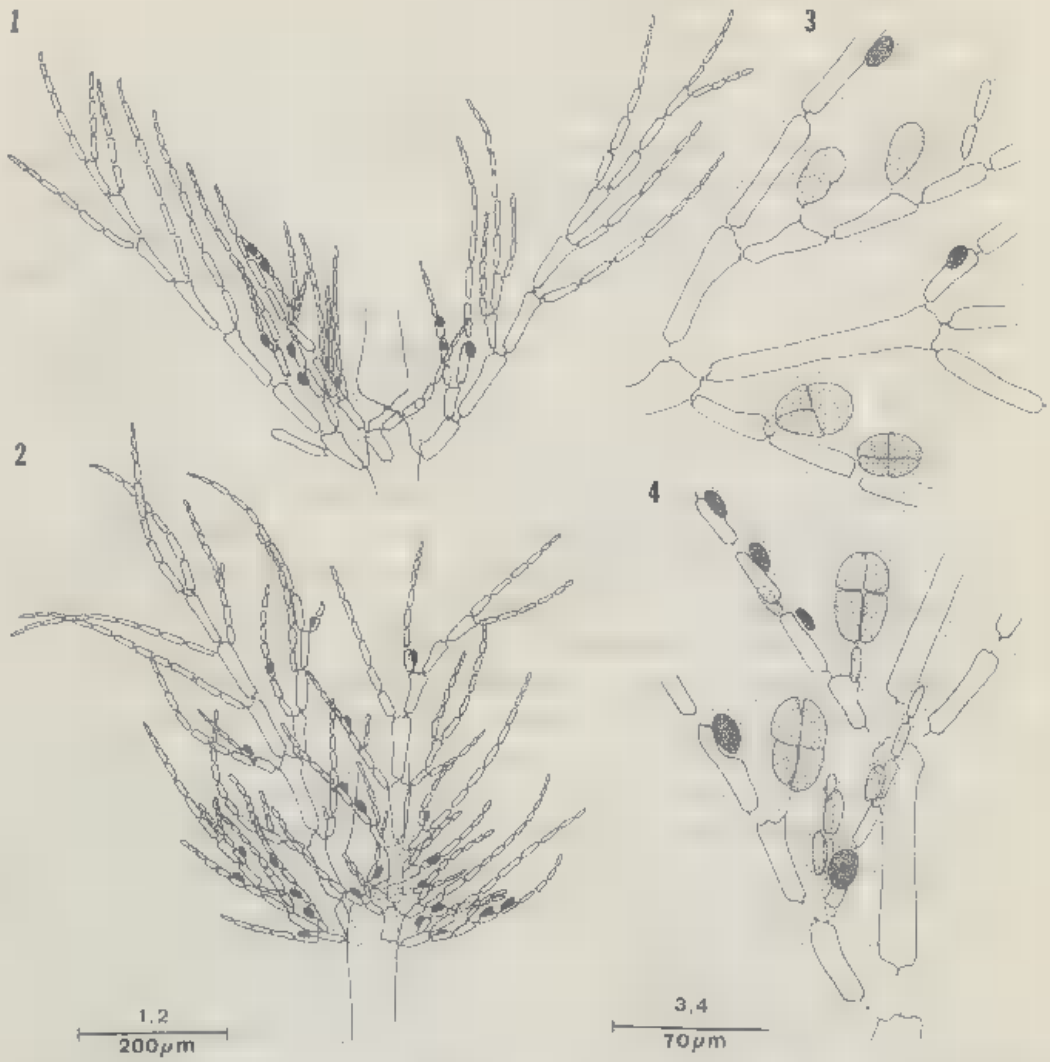

Fig. 1-4. – *Scagelia pylaisaei*. Fig. 1 : *Camera lucida* drawing of a single segment bearing three whorl-branches in a collection from Newfoundland (MW6335). Gland cells (in black) are borne on the lateral face of a single cell. Fig. 2 : Comparable view in a collection from Washington (MW 4938). Fig. 3 : Portion of a whorl-branch bearing tetrasporangia in a collection from Newfoundland (MW6357). Fig. 4 : Portion of a whorl-branch bearing tetrasporangia, sporangial primordia, and gland cells in a collection from Washington (MW 2801).

HANSEN and SCAGEL (1981) chose to recognize Kylin's *Antithamnion occidentalis* as a variety of their *Scagelia corallina*, differentiating it on the relatively greater abundance of gland cells in the variety. The question then is how variable is the presence of gland cells in Atlantic material of these related taxa. LUND (1959) has observed that gland cells can be extremely common in individuals, particularly older ones, of *A. boreale*, although they were lacking or scarce in others. He concluded that the relative abundance of gland cells is

highly variable and cannot serve to distinguish any of these forms. In my examination of four collections from Newfoundland (*Alg. Terrae Novae* # 199 & # 200; Wynne 6335 & 6357) I have found gland cells to be present in fair abundance in specimens from all four collections (Fig. 1). In some older-appearing thalli (Wynne 6357) the gland cells are especially abundant and conspicuous. They are invariably present ■■ lateral to a single vegetative cell of a whorl-branch in all of the material examined. YOSHIDA (1981) showed that gland cells can occur in great abundance in his *Scagelia corallina* (his fig. 10); they also are formed laterally on a single cell of the whorl-branches. The conclusion from these observations is that the presence or absence of gland cells and their relative abundance cannot serve as a useful trait in differentiating these Atlantic and Pacific populations of this alga.

YOSHIDA (1981) chose to retain his *Scagelia corallina* as distinct from *S. occidentalis* on the basis of the large axial cells and the bigger tetrasporangia in the former species. He gave measurements of 50-60 μm in diam. and 780-100 μm in length for the tetrasporangia in the Japanese *S. corallina*. For *A. occidentalis* from Washington (Wynne 2801) tetrasporangia average 36-40 μm in diam. and 54-62 μm in length (Fig. 4). For the Newfoundland *A. pylaisaei* (MW 6357) tetrasporangia measure 38-42 μm in diam. and 44-50 μm in length (Fig. 3). Axial cells in the Washington *S. occidentalis* were found to be in the range of 120-140 μm wide (for mature cells of the main axes), whereas comparable cells in the Newfoundland *A. pylaisaei* were observed to be 140-160 μm wide for the winter collection (# 200) but only 70-80 μm wide for the summer collection (# 199). YOSHIDA (1981) gave the width of the axial cells in his material as simple «up to 300 μm». It is not clear what the average figures are for the width of axial cells.

After this survey of descriptive accounts of these related taxa from both the North Atlantic and the North Pacific, supplemented by an examination of representative collections of the various forms, in particular from Newfoundland and Friday Harbor, Washington, it is my conclusion that *Callithamnion pylaisaei* Montagne (1837) should be transferred to *Scagelia*. On the basis of the variability observed in the various morphological features it appears highly reasonable to treat *Callithamnion corallina* Rupr., *C. lapponicum* Rupr., *C. americanum* Harv., *Antithamnion boreale* (Gobi) Kjellm., and *A. occidentalis* Kyl. as taxonomic synonyms of *Scagelia pylaisaei*. The following combination is therefore proposed :

Scagelia pylaisaei (Montagne) comb. nov.
Basionym : *Callithamnion Pylaisaei* Montagne, 1837, p. 351

Heterosiphonia wurdemannii

Heterosiphonia wurdemannii (Bail. ex Harv.) Falkenb., in its two varietal forms var. *wurdemannii* and var. *laxa* Børges., is now recognized to have a wide distribution in tropical seas throughout the world. First described from

Key West, Florida (U.S.A.) by HARVEY (1853), this species was later recognized to occur through the Caribbean (BØRGESEN, 1919; TAYLOR, 1960; NORRIS and BUCHER, 1982) southward to Brazil (JOLY, 1965) and in Pacific Mexico southward to the Galapagos (DAWSON, 1963). In the eastern Atlantic it has been recorded from the Canary Islands (BØRGESEN, 1930) and Salvage Islands (WEISSCHER, 1982), northwestern Africa (DANGEARD, 1949, 1952) southward to tropical West Africa (LAWSON and JOHN, 1982) and Angola (JOHN et al. 1981). It is also present throughout the Mediterranean Sea : western (RODRIGUEZ, 1889; FELDMANN, 1942), central (ZANARDINI, 1866; FUNK, 1927; GIACCONE and LONGO, 1976; COPPEJANS, 1983), and eastern (DOR, 1961). Its distribution extends into the Red Sea (NASR, 1947) and the Indian Ocean on the east coast of Africa (JAASUND, 1976). It is also known in the South Pacific (WEBER-VAN BOSSE, 1923; DAWSON, 1956, 1959; WOMERSLEY and BAILEY, 1970; CRIBB, 1983).

The name *Callithamnion crispellum* C. Ag. has often appeared in the literature as a taxonomic synonym of *Heterosiphonia wurdemannii*, e. g., in J. AGARDH (1863), ZANARDINI (1866), (MAZÉ and SCHRAMM, 1870-1877), ARDISSONE (1878, 1883), HAUCK (1885), DeTONI (1903), and COUPIN (1921). HOWE (1920) listed it as a synonym with ■ query. This species was described by C. AGARDH (1828) on the basis of a specimen sent to him by the Spanish botanist Antonio N. Cabrera (1763-1827) (PARDO, 1925) from near «Gades» (= Cadiz, southwestern Spain). J. AGARDH (1841) first regarded the senior Agardh's *C. crispellum* as an unfamiliar form of *Dasya arbuscula* (= *Dasya hutchinsiae* Harv. in Hook.) but admitted that its status was uncertain in the absence of fertile material. Subsequently, J. AGARDH (1863) stated that *C. crispellum* was actually *Dasya wurdemannii*, indicating that he had examined the type specimen. Since C. AGARDH's (1828) name predates HARVEY's (1853) name by 25 years, it seems strange that apparently no one has adopted the name with priority for this widely spread species, if indeed they are taxonomic synonyms.

Through the kindness of Per Lassen of the Botanical Museum, Lund University, it was possible to receive on loan the holotype of C. Agardh's *Callithamnion crispellum*, which is No. 44225 in the Agardhian Herbarium (LD). The packet has incribed on it : «Ceramium crispellum» as well ■ the word «Hutchinsia» scratched out. The only other words on it are «Cabrera» (the collector) and (somewhat illegibly) «artic striat». These latter words correspond to two words in Agardh's description, «articulis» and «striatis». This material, although scant, was examined and determined to consist of polysiphonous main axes comprised of five pericentral cells per segment and lacking cortication. The main axes are 107-120 µm wide, and individual segments are about 125-140 µm long. The ramelli are arranged alternately and bilaterally from every second segment of a main axis. Only the basal cell of each ramellus is polysiphonous.

The densely branched ramelli give the axes a squarrose appearance, a descriptive term that has often been applied not only to *Heterosiphonia wurdemannii* but also to some species of *Dasya* which resemble *H. wurdemannii*.

HARVEY (1853) remarked that *H. wurdemannii* can resemble «weak-growing forms» of *D. hutchinsiae*. DeTONI (1903) and HOWE (1920) pointed out that *H. wurdemannii* can easily be confused for *D. hutchinsiae* and *D. rigidula*. Also, the distributions of these several species overlap to a large extent (Spain, France, and the Mediterranean)*. So it is important to be certain of the identity of *Callithamnion crispellum*. The features present in the holotype of *C. crispellum* have been referred to above. They include the produciton of at least two segments to the sympodial main axis in each branch system (in contrast to a single segment in *Dasya*) and the alternate, distichous arrangement of the ramelli on both sides of the main axis, also characteristic of *Heterosiphonia* (BØRGESEN, 1919). Coupled with these features, the absence of cortication indicates that this holotype of *Callithamnion crispellum* C. Ag. is identical to *Heterosiphonia wurdemannii*.

Accordingly, the following transfer is proposed :

Heterosiphonia crispella (C. Agardh) comb. nov.
Basionym : *Callithamnion crispellum* C. Agardh, 1828, p. 183.

The variety *laxa* has been generally recognized in this species.

Heterosiphonia crispella var. ***laxa*** (Børges.) comb. nov.
Basionym : *Heterosiphonia wurdemannii* var. ***laxa*** Børgesen, 1919, p. 327, fig. 327-328.

DAWSON (1963) discussed the possibility that this variety might represent a distinct species. He also pointed out that the name *H. laxa* Kylin (KYLIN, 1925) already exists. Some workers have discussed their opinion that the squarrose form with four to six pericentral cells per segment (var. *wurdemannii*) tends to occur in shallow, exposed sites, whereas the soft, slender form with only four pericentral cells per segment (var. *laxa*) tends to be from deep water (FALKENBERG, 1901; BØRGESEN, 1919; NASR, 1947).

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* Interestingly, one fairly recent floristic account of the shoreline near Cadiz (SEOANE-CAMBA, 1965) did not list *Heterosiphonia wurdemannii, Dasya rigidula*, or *D. hutchinsiae*.

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